RESEARCH PROBLEM STATEMENT

Problem Title: Targeted and Adaptive Simulator Training for Winter Maintenance — No.: 05.02-07

Submitted By: David Strayer, University of Utah — **E-mail:** David.Strayer@utah.edu

1. Briefly describe the problem to be addressed:

The proposed project is an extension of an earlier UDOT research project developing and evaluating advanced simulator training for UDOT winter maintenance operators. In a pilot study, ratings of the training effectiveness were very high; the odds of getting in an accident were lower, and fuel efficiency was higher for trained drivers than for a matched control group. Plans now call for training ¼ of the maintenance operators each year over the next four years. The current research proposal is to develop an assessment procedure for targeting those drivers who will benefit most from training and provide an adaptive training procedure that customizes the simulator training to suit the specific needs of each driver. The assessment procedures may determine that some drivers are proficient at all the requisite skills and require little if any training, whereas other drivers may require considerabe training in specific problem areas. In addition, we plan to evaluate the effectiveness of the training by tracking performance of the trained drivers and use this information to further refine and customize the simulator training to maximize the cost effectiveness for UDOT.

Strategic Goal: Operations, Safety

2. List the research objective(s) to be accomplished:

1. Develop assessment procedures to target specific drivers for training
2. Develop methods for customizing the simulator training to the specific needs of each driver
3. Evaluate the effectiveness of training for those drivers who receive training and use this information to refine training protocols

3. List the major tasks required to accomplish the research objective(s): Estimated person-hours

1. Identify criteria for assessment procedures
2. Develop, validate, and administer assessment procedure on selected drivers
3. Identify targeted drivers who will benefit the most from training
4. Develop pre-training high-fidelity simulator screening protocol to identify specific strengths and weaknesses of drivers
5. Develop post-training high-fidelity simulator screening to determine effectiveness of training
6. Develop procedures and incentives for drivers to keep accurate records of fuel and vehicle usage
7. Collect and evaluate on-road driving performance measures (e.g., accidents, fuel usage, etc.)
8. Produce final technical report

4. Outline the proposed schedule (when do you need this done, and how we will get there):

There will be two major components to the project. The first is to develop methods for assessing the skill set of drivers, identifying those who are likely to benefit most from the simulator training and customizing the training to suite their needs. These procedures should be in place at the end of the first year of the project. The second component of the project will be to evaluate the effectiveness of training by tracking the performance of drivers over a two years period (two training cohorts compared to matched drivers who have not undergone training). Assessment should be completed and technical report submitted by the end of the second year of the project.

5. Indicate type of research and / or development project this is:

Large: ☒ Research Project ☐ Development Project
Small: ☐ Research Evaluation ☐ Experimental Feature ☐ New Product Evaluation ☐ Tech Transfer Initiative : ☐ Other

6. What type of entity is best suited to perform this project (University, Consultant, UDOT Staff, Other Agency, Other)?

University of Utah

7. What deliverable(s) would you like to receive at the end of the project? (e.g. useable technical product, design method, technique, training, workshops, report, manual of practice, policy, procedure, specification, standard, software, hardware, equipment, training tool, etc.)
Deliverables will include a method for targeting the drivers who will benefit the most from training, a method for customizing the training to meet the specific needs of the drivers, and a technical report describing the effectiveness of training.

8. Describe how will this project be implemented at UDOT.

Facilities for the research project will be at the University of Utah and at L3 Communications. The procedures will be integrated into the ongoing advanced simulator training by identifying the drivers who will benefit most from training.

9. Describe how UDOT will benefit from the implementation of this project, and who the beneficiaries will be.

UDOT will benefit by improving the safety (and fuel efficiency) of winter maintenance operations. The procedures for targeting drivers who will benefit most from training and methods to adaptively customize the training will increase the cost effectiveness of the training for UDOT. The pilot study suggests that training will result in a significant reduction in accidents and an increase in fuel efficiency.

10. Describe the expected risks, obstacles, and strategies to overcome these.
To evaluate changes in performance following training, it is necessary that records of accidents, incidents, and other safety information be collected for the drivers who are targeted for training and for a comparison group who does not receive training. We will also need to obtain accurate fuel consumption records (i.e., MPG) for each vehicle/driver. Records of accident data in the pilot study were adequate, however better data monitoring is needed for fuel records. We will need to develop procedures for drivers to keep accurate fuel logs and to monitor which vehicles were used.

11. List the key UDOT Champion of this project (person who will help Research steer and lead this project, and will participate in implementation of the results): Richard Clarke, Shana Lindesy

12. Estimate the cost of this research study including implementation effort (use person-hours from No. 3): $69,000

13. List other champions (UDOT and non-UDOT) who are interested in and willing to participate in the Technical Advisory Committee for this study:

Name	Organization/Division/Region	Phone	Attended UTRAC?
A) David Strayer	University of Utah	581-5037	Y
B) Frank Drews	University of Utah	585-1977	Y
C) Ira Bickford	UDOT	965-4119	Y
D) Jeff Hulse	UDOT	965-4510	N
E) Todd Richins	UDOT	975-4964	N
F) Dennis Blessinger	L3 Communications	303-5641	N
G) Paul McKee	L3 Communications	994-2138	N

14. Identify other Utah agencies, regional or national agencies, or other groups that may have an interest in supporting this study: AZ-DOT